HEATED GARMENT SYSTEM

TECHNICAL FIELD

The invention relates to a heated garment system and particularly to a flexible, electrically powered heated garment system, which may be in the form of any item of apparel. Such a garment may be used as a stand-alone garment or may have further layers applied to produce more advanced garment systems.

BACKGROUND

Existing heated garment systems rely on hard wiring technology to produce the desired heating effect. The main disadvantage to this is that it detracts from the aesthetic and comfort aspects of the item. This can be a considerable drawback due to the occlusive nature of a number of apparel items, in particular intimate apparel. Typically, existing heated garment elements consist of a metal wire or strip situated in the region where heating is required. Some examples of these being Johnson et al US3663796, Doosung WO030059099 and Bala et al US2002146948. The elements are connected to a power supply via electrically conductive wires, which are typically bonded to the body of the garment underneath a layer of fabric.

Previous versions of heated garment systems incorporated a power supply built into a belt to be worn around the waist and hence the connectivity wires ran from the belt along the torso and limb to the garment. An example of this is Traffanstedt et al US4705935, where a heated sock is controlled and powered via a unit secured to a belt located at the wearer's waist region. This is a very restrictive and inconvenient arrangement. Many versions of heated garments include a pocket on the garment itself in which to house the power supply such as that of Murphy et al US3396264, where the power supply for a heated sock is housed in a pouch located in the welt region. Such systems have used bulky, standard domestic batteries as the power supply. In addition, these garments have also offered the wearer the ability to select the desired heating effect by way of a separate controller. These systems are unsatisfactory because of the rigidity of the heating element component and connectivity wires, and the bulk of the power supply. The presence of these rigid and bulky components can cause

considerable discomfort to the wearer. Both of these are major drawbacks, particularly for apparel intended to be worn next to the skin.

These prior art garments are not exhaustive but are exemplary of the state of the art. While such prior art devices provide an active heating effect in a resulting garment there exists a need for a heated garment system that lends itself to conventional methods of garment manufacture, and is thus commercially and economically viable, and retains all of the physical and aesthetic properties associated with such garments.

OBJECT OF THE INVENTION

An object of this invention is to provide a heated garment system, which is capable of emitting heat when an electrical current is applied. The garment system should retain the aesthetic and durability properties of conventional garments but also provide a new level of functionality through the incorporation of an unobtrusive heating element or should at least provide the public with a useful choice.

Such garments may be worn both indoors and outdoors as a conventional garment or, via the portable power supply and controller, be used as an active heating device.

SUMMARY OF THE INVENTION

The invention provides a heated garment system produced via a knitting, weaving, or non-woven process where the heating area and connectivity components are incorporated into the system during fabric manufacture.

In particular, the invention provides a heated garment system that is produced in a single manufacturing process.

More particularly, the invention provides a flexible garment system which is capable of emitting heat when an electrical current is applied, comprising an electrically insulating fibre base structure with an electrically and thermally conductive area and at least two power supply lines, all of which are incorporated during the textile manufacture stage.

The electrically insulating base may be woven, knitted or non-woven fabric made of natural, regenerated or synthetic fibres.

The complete system contains a majority of electrically insulating fibres, with a minority of electrically and thermally conductive yarns or fibres.

The electrically and thermally conductive heater area may be composed of one of the following fibres:

1) Metal fibres
2) Carbon fibres
3) Metallised polymer fibres
4) Conductive polymer coated fibres
5) Conductive polymer fibres

or from a combination of these materials.

The electrically and thermally conductive heater area may be composed of fibres as described above blended with fibres as described above.

The system may be powered by connection to a self-contained power supply.

There may be a further base structure with a thermally conductive area applied to this from a more advanced garment system.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example only and with reference to the accompanying drawing in which:

FIGURE 1 shows the active garment system
FIGURE 2 shows the heater section within the garment

As shown in Figure 1, the heated garment comprises a flexible fabric-based system. This may consist of either a single or a multi-layer fabric arrangement depending upon both the form of the garment and its potential working environment. The heating

element is integrated into the textile structure during knitting, weaving or non-woven manufacturing. The base garment (4) is constructed from fibre that is not electrically conductive, while the heating element (1) is constructed from a blend of non-conductive fibres with electrically and thermally conductive fibres. Two or more yarn-based power supply lines (2) are incorporated to supply the panel with electric current. These are directly connected to a controller and power supply via electrically conductive fasteners (3).

As shown in Figure 2, the heating element extends to cover the areas of the garment where an active heating effect is desirable. The power lines (2) are incorporated into the base structure of the garment and run from the electrical connectors to either side of the heating element. The invention is designed to be powered via a compact portable power supply and control unit with appropriate voltage and current transformations (not shown).

It is to be understood that the drawings and descriptions are designed solely for the purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the claims.

EXAMPLE 1

A heated sock with the base structure consisting of electrically insulating material, natural and/or synthetic fibres, with a conductive area, composed of stainless steel fibres blended with natural and/or synthetic fibres, with two or more fabric power lines. When electricity is supplied to the garment the element emits heat.

EXAMPLE 2

As per Example 1 except the conductive area is composed of carbon fibre that may be blended with natural and/or synthetic fibres.

EXAMPLE 3

As per Examples 1 and 2 but in the form of a tube of any diameter which may be used in the treatment of orthopaedic, arthritic and rheumatic conditions.

EXAMPLE 4

As per Examples 1 and 2 but in the form of an athletic bandage, which may be used in the treatment of sports injuries.

EXAMPLE 5

A heated glove where the base structure and electrically and thermally conductive areas form a layer within a multi-layer garment system.

EXAMPLE 6

A heated vest consisting of a base structure and an electrically and thermally conductive area as described in Example 1.

INDUSTRIAL APPLICABILITY

The invention provides a heated garment product with aesthetic and performance properties of conventional garments. The product can be used in the form of a sock, glove, vest, body vest, long-john, bandage or support, or other garment for personal wear or use or in the form of layers for more advanced garment systems.